

than is generally believed: the Plenty river, at its source in the ranges where the water first oozes out of the mossy ground, already shows evidence of chlorides in solution; the clay, *in situ*, at the Old Exhibition Reserve, in which the sample of gaspipe exhibited has decayed, retains 13 oz. of salt, at least, per cubic yard, although it is of a highly porous character, although situated at one of the highest levels in Melbourne, and doubtless after occupying its present position high above the sea for a long continuance of centuries, subject all the time to the influence of rain soaking into it, and having a greater or less power of dissolving and removing the salt. It is true that the subsoil partakes something of the nature of a barrier, the drainage escaping in many cases over it rather than through it, so that soluble saline matters travelling down into the subsoil may be thus cut off from the further transporting influence of drainage.

I will close these statements and suggestions with an incidental remark concerning the salting of land—namely, that it does not necessarily follow that the salt is in all cases derived *directly* from the sea, that the salt is that which was in the soil or clay or rock at the time when it formed a sea bottom, and was submerged in brine. The atmosphere may be ascertained to perform an important office in this respect intermediate between the sea and the land. There is reliable evidence that the atmosphere performs this function in some degree. To measure the extent to which the air acts as a distributor of sea-water constituents over the land would be a work replete with interest. It is a question which may prove itself closely related to the sciences of hygiene and agriculture, and even with geology.

ART. V.—On η Argus and Jupiter's Spectrum. By
A. LE SUEUR, ESQ.

[Read 14th March, 1870.]

I take this opportunity of mentioning that since the last meeting, the star η Argus has been examined with the original apparatus, modified so as to admit of a larger dispersion.

With this new arrangement the red line keeps its place and character, the yellow is seen to be slightly less refrangible than *D*.

The green lines, difficult before, become almost unmanageable; considering, therefore, that mere extra dispersion instead of diminishing the visibility of real lines should, if anything, make them more conspicuous, the latter observations throw some doubt on the conclusions originally arrived at. In the paper read at the last meeting it was noticed that there were two ways of accounting for the appearance of the spectrum of η Argûs. 1st. That it is a spectrum of groups of dark lines separated by more or less bright spaces. 2nd. That the bright lines are real and not due merely to comparative absence of absorption.

The former supposition was discarded in favour of the latter, which was supported by strong collateral evidence.

The behaviour of the red line,* with the larger dispersion, is strongly in favour of the original conclusion that the star is, even at the present low magnitude, enveloped by an atmosphere of hydrogen at high temperature, but the diminished visibility of the green lines points to the possibility that the appearance of this part of the spectrum is due merely to comparative absence of dark lines over moderately wide spaces.

There seems to be no reason for objecting to this double nature of the spectrum, all red variables sufficiently bright to bear a fine slit, are found to have a spectrum of groups, and some variables in certain phases (T coronæ at maximum for instance) develop bright hydrogen lines. Spectroscopic observations of small stars is so very difficult that we can hardly hope to obtain more satisfactory evidence until η Argûs has increased in brightness.

The spectrum of the star near maximum may, from physical causes, differ somewhat in character from that seen at present, but evidence will no doubt be then adduced whereby the appearance at the lower stages may be more certainly accounted for.

Spectrum of Jupiter.

In the spectrum of Jupiter, the principal Fraunhofer lines are, as might be expected, readily seen; besides these there are lines of absorption, one of which is decisively proved by Mr. Huggins' observations to have its origin in Jupiter's atmosphere.

* Of the blue line I cannot speak with as much confidence, the faintness makes it difficult of observation, but I think it is as well seen with the larger dispersion as it was at first.

With the Melbourne Reflector we have command of conditions more favorable than those under which Mr. Huggins' worked, but the conditions may be considerably varied at pleasure, and when by such variation the light was reduced to an intensity probably much less than that at Mr. Huggins' disposal, the line in question (914 of Mr. Huggins' diagram) was still conspicuous; so unexpectedly conspicuous, indeed, that until its position had been accurately determined, the line was mistaken for an atmospheric one strongly marked in low sun spectra, but, as was afterwards found, not readily visible on Jupiter when at considerable altitudes.*

Considering therefore that the line or rather group, escaped Mr. Huggins' notice with his earlier apparatus, there is good reason for supposing that the absorption by Jupiter's atmosphere of that particular kind of light varies considerably. If this should prove to be the case, it will be interesting to note the degree of absorption in connection with the character of Jupiter's visible disc.

With reference to this point, I may remark that the appearance of Jupiter last year was somewhat unusual, the principal peculiarity being a change in the colour of the central band from white to yellow, and I believe a greater yellowness of the general surface.

A sufficient reason for increase of visibility in the Jupiter line may be found in a diminution or depression of cloud, whereby the light would have to traverse greater thickness of atmosphere; the greater yellowness of the surface is also fairly accounted for on the same supposition.

Jupiter was taken in hand principally to note any peculiarity in the light from different parts of the surface, for which purpose the Melbourne Reflector, owing to its great focal length, is specially suited.

The method generally adopted was to place the slit of the spectroscope perpendicular to Jupiter's equator; by this arrangement a spectroscopic picture of the surface is presented to the view, and an admirable opportunity afforded of comparing the spectra of the different zones, and of noting

* 882 of Mr. Huggins' diagram (the numbers throughout refer to this diagram accompanying Mr. H.'s paper on Jupiter.)

This line was well seen together with 914 when Jupiter was near the horizon.

882 was nearly as dark as 914, which did not seem to have increased from the additional absorption of the earth's atmosphere; this was not unexpected, for the corresponding group in low sun spectra is very faint.

the behaviour of the known Jupiter lines as they cross these zones.

The diagram represents Jupiter and the corresponding spectrum, as seen on the night of 11th December, 1869; the general features were the same during November and December.

N P was slightly yellow and crossed by fine hair lines.

P Q white, the brightest part of the surface.

Q R dusky yellow.

R T white.

T S faintly yellow.

P Q R T dark brown.

In the spectroscopic image *P Q* was conspicuous throughout the length of the spectrum, from its brightness.

N P, T S beyond being less bright than *P Q*, showed no marked peculiarity, the more refrangible end was well seen, probably somewhat absorbed, but of this there was no certain evidence.

On *Q R* the absorption at the more refrangible end was strongly marked, gradually fading away to about *E*, from which point *Q, R* were seen separately with a spectrum between them of nearly the same brightness as the corresponding part on the polar segments.

* *P* was readily seen throughout the spectrum as a dark line.

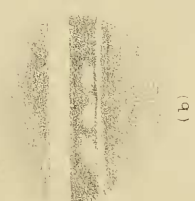
* *T* was conspicuous only at the red end.

The absorption lines, especially 914, were narrowly watched, but gave no certain indications; the narrowness of the dark belts was unfavorable to the inquiry, so that with respect to these the negative evidence is of little weight, but the north and south segments and the zones between the dark belts were sufficiently wide to afford an opportunity of detecting any marked peculiarity in the spectral line as it crossed them.

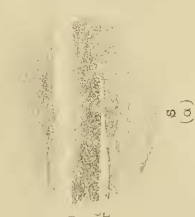
Somewhat contrary to expectation, the line retained an apparently constant character throughout.

We are therefore led to infer that the light from the different parts of the visible surface had passed through not

* On some of these belts a greenish and occasionally a reddish tinge was suspected.



(b)



(c)

N